Exhibit B

UNITED STATES OF AMERICA

v.

MICHAEL NOWAK

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF ILLINOIS

EASTERN DIVISION

CASE NO: 19 CR 669

DECLARATION OF JEREMY CUSIMANO APRIL 10, 2023

ALVAREZ & MARSAL DISPUTES AND INVESTIGATIONS LLC
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BOSTON, MA 02110

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I. QUALIFICATIONS

1. I am a Managing Director with Alvarez & Marsal Disputes and Investigations LLC ("A&M") in Boston, Massachusetts. My practice specializes in financial markets, trading, compliance, risk, and controls. I have extensive experience in global financial markets, economic analysis, investigations into commodity and derivatives trading, and regulatory policy.
2. I hold a B.S. in Economics from the Rochester Institute of Technology and an M.S. in Environmental and Natural Resource Economics from the University of Maine. Prior to joining A&M, I was a Managing Director with Grant Thornton LLP where I led the firm's commodities and derivatives-related advisory services. I also previously served as Economic Advisor to the Director of Enforcement at the U.S. Commodity Futures Trading Commission ("CFTC") and Chief Economist for Petroleum Reserves at the U.S. Department of Energy. My full curriculum vitae, attached as **Appendix A**, lists my experience, qualifications, prior testimony during the last four years, and publications over the last ten years.
3. While serving at the CFTC, I developed and led the agency's first group of economic experts dedicated to the forensic analysis of trading and market events to identify potential violations of the Commodity Exchange Act. I have performed many investigations involving exchange-traded and over-the-counter ("OTC") physical commodities, financial derivatives, and other securities. Across these investigations I have developed quantitative models to analyze complex market structures and derivatives portfolios, evaluated trading and risk management strategies, and valued portfolio impacts of market activity. I have provided expert analysis to support many regulatory and law enforcement investigations on topics including potential price manipulation, disruptive trading, trade practice regulation, electronic trading systems irregularities, and fraud.
4. Counsel for Michael Nowak asked me to review the analysis of Prof. Kumar Venkataraman, including his calculation of loss allegedly suffered by "*other market participants as a result of the Defendants' activity that follows the four-step process described*" in his December 22, 2022 declaration ("Venkataraman Decl.").[1]

[1] Venkataraman Decl., p. 4.

5. My analyses and opinions in this declaration are based on work performed by me and those under my supervision, as well as my training, education, and experience.
6. In reaching my opinions, I and people working under my supervision: (a) performed research; (b) prepared analyses; and (c) reviewed various materials and information produced about this case, primarily those referenced below.
7. My opinions depend solely on work performed through the date of this declaration. I reserve the right to supplement my opinion should further documentation be produced that bears on any of my analyses, and to respond to any other expert opinions proffered by or on behalf of the parties.

II. SUMMARY OF OPINIONS

8. On August 10, 2022, a jury convicted Mr. Nowak and Gregg Smith ("Mr. Smith," "Smith," together, the "Defendants") of attempted price manipulation, spoofing, commodities fraud, and wire fraud affecting a financial institution stemming from their trading activities and acquitted them of conspiracy and racketeering conspiracy. Mr. Nowak and Mr. Smith each traded precious metals futures contracts on the CME Group, Inc. ("CME") commodity exchange. Mr. Nowak's primary job function was that of an OTC precious metals options trader and market maker. In that role, he used the CME precious metals futures markets to manage (e.g., hedge) the trading risk associated with his options book.
9. As described more fully below, I have concluded the following based on my review and analysis:
    a. Prof. Venkataraman's selection of spoofing sequences is unreliable, because it is based on drastically overinclusive criteria that deviate from industry standards, the spoofing parameters applied in other spoofing cases, and the spoofing characteristics that Prof. Venkataraman himself described as relevant at trial. These selection criteria are so broad that they are not rationally related to intent to cancel and would not be relied on to identify spoofing in any context that I am aware of.
        i. Because these criteria are so broad, Prof. Venkataraman has identified as spoofing many sequences that exhibit no spoofing characteristics, including sequences where the alleged spoof orders have long resting durations and are placed many price levels away from their alleged opposite orders.
    b. Prof. Venkataraman's calculation of loss is unreliable, because it suffers from a number of serious methodological flaws, including:
        i. Prof. Venkataraman assumed that the alleged spoof orders caused other market participants to cross the bid-offer spread to trade or trade at worse prices, without performing any valid analysis to demonstrate a causal relationship between the two events, nor did he provide a basis from which one could reasonably infer causation. In addition, sequences were included in his spread-crossing assessment where the alleged victims did not even cross the bid-ask spread to trade (18,908 of Prof. Venkataraman's total).

ii. Both of Prof. Venkataraman's adjusted loss calculations rely on the use of poorly selected "control periods," where the only variables controlled are 1) duration (controlled only in some cases, as the total duration of his control periods was 18.2% shorter than the total duration of corresponding spoofing sequences), and 2) proximity in time. Controlling just these two variables is insufficient to generate a comparative or predictive model to isolate the impact of alleged spoofing because they do not account for key market factors. He also includes losses from sequences with higher or equal rates of spread-crossing compared with their corresponding spoofing sequences, which should yield no loss at all (27.7% of the alleged spoofing sequences for Mr. Nowak).

iii. There is no evidence that market participants would have received Prof. Venkataraman's "but-for" prices, because he selected prices on the same side of the order book as the alleged victims (e.g., the best bid if the alleged victim was likewise a bidder).

iv. Data analysis proves that excess spread-crossing potentially caused by imbalances in the gold futures market dissipates after approximately two seconds, and market imbalances purportedly caused by Mr. Nowak's alleged spoof orders resolve within 3.2 seconds of Prof. Venkataraman's 30 lot threshold being reached and within 0.9 seconds of the last order in the scale being placed. As a result, there is absolutely no basis for calculating losses for up to 82.3 seconds, as Prof. Venkataraman does. There is no rationale for Prof. Venkataraman assessing losses for over 78 seconds after data shows market imbalances are corrected.

c. Prof. Venkataraman's loss calculations, both adjusted and unadjusted, vastly and unjustifiably overestimate the market harm that could reasonably be attributed to Mr. Nowak's alleged spoofing. I have performed my own analysis of theoretical market harm from Mr. Nowak's alleged spoofing sequences, accepting the assumption that Mr. Nowak in fact spoofed on at least some occasions, and following, without endorsement, Prof. Venkataraman's general framework for assessing losses associated with alleged spoof orders. However, I altered Prof. Venkataraman's flawed

assumptions and methods to produce a more reliable calculation of market harm. If the Court chooses to adopt Prof. Venkataraman's premise that loss is calculable, my proposed method, described in full in Section VI, is more economically sound and provides a more realistic estimate of market harm possibly attributable to Mr. Nowak's alleged spoofing.

d. My analysis and adjustments to Prof. Venkataraman's flawed assumptions and methodology resulted in a total theoretical loss attributable to Mr. Nowak's alleged spoofing sequences of $59,927 to $70,452.

III. RELEVANT BACKGROUND

A. Overview of Futures Trading and Spoofing

10. Mr. Nowak was a gold options trader and market maker at JPMorgan, in which capacity he executed options trades facing the bank's clients and was responsible for managing the aggregate risk of his options portfolio, which he did in part through trading gold futures contracts on the CME Group ("CME") exchange.
11. Precious metals traders place futures orders on Globex, the electronic trading system used by the CME exchanges, to place anonymous orders to buy or sell futures contracts at specified prices. Globex displays outstanding orders on the visible "order book," which consists of the orders resting at the ten best bid price levels (orders to buy) and the ten best offer price levels (orders to sell).
12. Since July 2011, the Commodity Exchange Act has expressly prohibited "spoofing" as a disruptive trading practice. Spoofing is defined as a market participant's submission of a bid or offer with the "intent to cancel the bid or offer before execution." [2]
13. Mr. Nowak was convicted of attempted price manipulation, spoofing, commodities fraud, and wire fraud affecting a financial institution, and acquitted of conspiracy and racketeering conspiracy. At trial, the U.S. Department of Justice ("DOJ") presented 100 trading sequences that were characterized by certain broad parameters that the DOJ contended were indicative of spoofing (though not nearly as broad as the parameters that Prof. Venkataraman used in the analysis I evaluate here).
14. As part of the DOJ's effort to show market harm, it engaged Prof. Venkataraman to analyze the Defendants' and cooperating witnesses' trading, identify trading sequences that potentially correspond with the spoofing pattern presented by the DOJ at trial, and calculate the alleged market harm resulting from this activity. As Prof. Venkataraman conceded at trial, he used an overinclusive methodology that does not account for many parameters the DOJ asserted were indicative of spoofing, as described more fully below, to identify 132,265 sequences from January 4, 2008, to June 8, 2016. Of these, 6,063 sequences involved trading

[2] 7 U.S.C.§ 6c(a)(5).

by Mr. Nowak ranging in time from June 18, 2009, to February 7, 2014.[3] These episodes also include times when the opposite orders were not executed.[4] Based on my review, I have identified broader trading and order submission data for Mr. Nowak that covers the period of April 17, 2009, to July 30, 2014 (the "Nowak Period").

B. Available Data

15. To assist in my evaluation of Prof. Venkataraman's analysis, I conducted my own analysis of Mr. Nowak's trading. In doing so, I reviewed "ARMADA" data (internal data on the state of the order book over time) provided by CME for the full Nowak Period, as well as additional market, trading, and financial information. With access to the ARMADA data, there is no additional processing required to determine the state of the order book at any particular point in time.
16. In addition, CME produced "RAPID" data (data that capture each order submitted to Globex and trades executed in the market) for the full Nowak Period. These data reflect orders placed, executed, modified, and canceled, as well as order characteristics including size, time, and price. From these data, I was able to conduct a detailed analysis of Mr. Nowak's order submission and trading patterns with counterparties and other market participants in the trading sequences that have been flagged by Prof. Venkataraman.[5]
17. I obtained OTC trade records from JPMorgan's internal trade and risk system (Athena) from 2010 to 2014. This system allows traders to enter orders as well as manage and analyze risk associated with their positions. The data obtained from this system include all records of order entry, trade execution, and life cycle events such as options exercises, expirations, and terminations. From these data I was able to assess the size of Mr. Nowak's OTC options, spot, forwards, and swaps trades in gold, relative to the size of his futures orders.

[3] Of these, 113 are sequences in which Mr. Nowak and another trader on the JPMorgan precious metals desk (either Mr. Smith or John Edmonds or Christian Trunz) allegedly spoofed in gold futures on the same side of the market during overlapping windows of time, and the remaining 5,950 are sequences in which only Mr. Nowak allegedly spoofed.
[4] Venkataraman Decl., p. 7.
[5] To understand the direction of spread-crossing in my analysis, it is necessary to know which side of a trade is the aggressive side. Prior to January 13, 2013, when there was not an "aggressor" field in the RAPID data, I identified the two orders that traded with each other, found the most recent new order message, price modification, or stop trigger associated with each order, and labeled the order with the most recent update prior to the trade as the aggressor.

IV. METHODOLOGICAL FLAWS IN PROF. VENKATARAMAN'S IDENTIFICATION OF SPOOFING SEQUENCES

18. Based on my experience identifying and analyzing potential spoofing activity, Prof. Venkataraman has selected spoofing identification criteria that are vastly overinclusive and sweep in a significant volume of trading that exhibits *none* of the hallmarks of spoofing, let alone all of the spoofing characteristics he identified as relevant to the jury at trial. Prof. Venkataraman did not even follow the methodologies he previously used in the *Vorley* and *Bases* cases. Without explanation, Prof. Venkataraman adopted broader identification criteria here that are even more overinclusive.[6]

A. Prof. Venkataraman Applied Selection Criteria So Overinclusive That They Are Not Rationally Related to Spoofing

19. Prof. Venkataraman's selection of spoofing sequences relied on broad criteria that cannot support an inference of intent to cancel across the thousands of alleged spoof orders he identified. As far as I am aware, criteria as broad as these have never been used or accepted as a reliable basis for identifying spoofing in any other context, including in the *Vorley* and *Bases* cases.

20. The only parameters Prof. Venkataraman applied to identify "spoofing" for this analysis were:

    a. A resting fully visible group of orders placed by Mr. Nowak, Mr. Smith, or a cooperating witness, which Prof. Venkataraman calls a "spoof order";

    b. A smaller limit order on the opposite side of the market, which Prof. Venkataraman calls an "opposite order";

    c. Both alleged spoof and opposite orders must be placed within the top ten levels of the order book (but need not remain in the top ten levels throughout the sequence, as the market moves);

    d. Alleged spoof orders must have aggregate quantities of at least 30, 15, 20, and 20 contracts for gold, silver, platinum, and palladium, respectively;

[6] My analysis focuses primarily on Mr. Nowak's trading, as I understand he was acquitted of conspiracy and there has been no evidence of joint or coordinated spoofing.

e. Alleged spoof orders ("the large, fully displayed layers of the Spoofing Sequences") must have durations within the 99th percentile, or 82.3 seconds, of the duration distribution, meaning 82.3 seconds or less;

f. Alleged spoof orders must be placed in the same lot sizes selected by the DOJ for that trader in the DOJ episodes; and

g. If there are groups of fully displayed limit orders (i.e., non-iceberged) on both sides of the market, the larger side must have an aggregate quantity of at least twice the smaller side.

21. These selection criteria do not include most of the alleged spoofing characteristics Prof. Venkataraman told the jury were important indicators of spoofing, including: 1) cancelation of the alleged spoof order (let alone the rapid cancelation he described at trial)[7]; 2) short duration of the alleged spoof order; 3) presence of a significant market imbalance; 4) low fill rates of the alleged spoof orders; and 5) adherence to the four-step pattern (now he claims a two-step pattern is sufficient, as rapid cancelation of the spoof order and the filling of the opposite order are no longer required for a sequence to be identified as involving spoofing). Prof. Venkataraman explained during his trial testimony that all of these characteristics are relevant to distinguishing spoofing from legitimate trading, yet none of them appear in his methodology for defining spoofing.

22. I have extensive experience investigating manipulative trading and distinguishing spoofing from legitimate market activity both from my time at the CFTC and from designing and evaluating trade surveillance programs for financial institutions. Because Prof. Venkataraman's parameters are so broad, I would not have relied on them at the CFTC, nor anywhere else, to screen for possible spoofing, let alone to determine that market activity is likely to be actual spoofing.

23. The criteria employed by Prof. Venkataraman are even more overinclusive than those he adopted in the *Bases* case,[8] despite his claim that he "follow[s] the same general

[7] Prof. Venkataraman has included nine alleged spoofing sequences for Mr. Nowak where the alleged spoof orders were never canceled and were, in fact, fully filled.

[8] Prof. Venkataraman also claims he applied the same methodology in *Vorley*. This is not so, as in *Vorley* Prof. Venkataraman required that the alleged spoof and opposite orders be placed in the first five levels of the visible order book, meaning that, by being closer to the front of the order book the market is more likely to find them relevant.

methodology for calculating market harm that [he] performed in connection with" that case.[9] The "Relevant Trading Activity" sections of Prof. Venkataraman's declaration in *Bases* and in this case reveal that to be incorrect. In *Bases*, Prof. Venkataraman applied criteria that, while still overinclusive, bear a closer tie to his trial testimony about the characteristics of spoofing. For example, in that case, he defined a "spoof order" as an order "placed within the top five levels of the order book, canceled within five seconds of placement, and for at least ten contracts at placement," and with an aggregate volume of 25 total contracts active at the same time.[10] Opposite orders had to be iceberg limit orders within the top five levels of the order book. Prof. Venkataraman also excluded from his analysis in *Bases* sequences with fully displayed orders placed on the same side of the market and within five ticks of the opposite order and sequences where Defendants placed marketable (spread-crossing) orders on the same side as the alleged spoof orders. *None* of these criteria are applied here. As a result, thousands of trading sequences are identified as "spoofing" that would not have been identified in *Bases*, and the inference of spoofing is even more tenuous in this case.

24. It is important to note that all 100 of the Nowak sequences Prof. Venkataraman presented at trial would have been captured if he had limited his screening to scaled orders that were placed in the top five levels of the order book and canceled within five seconds, as he did in *Bases*. The broader selection criteria presented in Prof. Venkataraman's declaration here, on the other hand, capture a significant amount of market activity that does not resemble the trading that was shown to the jury at trial. Prof. Venkataraman does not acknowledge this newly overbroad methodology or offer any justification for removing key identification criteria for the purpose of analyzing the data in this case, nor is it evident why Prof. Venkataraman chose to widen the selection criteria for this case compared to the methodology he found reliable in *Bases*.

25. To understand the impact of Prof. Venkataraman's decision to broaden his selection criteria, I applied the episode identification methodology he used in *Bases* to the alleged spoofing sequences that he identified for Mr. Nowak and found that only 3,130 of Mr. Nowak's 6,063 identified spoofing sequences would have been fully captured had Prof. Venkataraman used

[9] Venkataraman Decl., p. 6 n.11.
[10] Venkataraman Bases Decl., p. 6.

the *Bases* parameters (at least one scaled order group from an additional 527 sequences would have been captured by the *Bases parameters)*.

26. Broadening his selection criteria to this extent is a serious methodological flaw, which can be illustrated by comparing his approach to standard trade surveillance practices for spoofing identification. Trade surveillance begins by applying broad screening criteria to identify a population of *possible* spoof orders, but even those screening criteria are rarely as broad as those Prof. Venkataraman applied here. Factors that are commonly used in generating spoofing or layering trade surveillance alerts include order size or aggregate order imbalances, order resting duration, order resting depth, cancelation rates, and a trader's historical or "normal" behavior. Orders that are flagged by such surveillance screens are then analyzed and investigated to understand the circumstances around their placement and to evaluate the trader's intent in light of his typical trading patterns. Then, if supported by the analysis and facts of the investigation, they are identified as likely to be spoofing.
27. Prof. Venkataraman loosely followed the first step of applying broad screening criteria to identify a wide population of possible spoofing, but he did not follow the second critical step of further evaluating the population of possible spoofing sequences for characteristics that are consistent with spoofing and using that analysis to narrow the population down to only those trades that are reasonably likely to be consistent with spoofing. Instead, he analyzed the wide population for spoofing characteristics and concluded that, *because such characteristics exist in some portion of the population, the entire population meeting the broad screening criteria was consistent with spoofing*. Essentially, instead of removing those episodes that did not exhibit the set of spoofing characteristics, as a sound methodology would do, he continued to label them spoofing sequences with no basis beyond the initial screening criteria, which do not support any inference of spoofing. In my experience and based on my expertise, this is not a rational or accepted method to identify spoofing, and Prof. Venkataraman's opinions and conclusions based on these criteria are unreliable.
28. Rather than conducting an appropriate analysis, Prof. Venkataraman has calculated values like *median* alleged spoof order duration and *average* alleged spoof order volume across all of his alleged spoofing sequences (mixing both Defendants and the cooperating witnesses). He then makes unsupported assertions regarding what inferences can be drawn from these statistics. However, basic statistics like these are no substitute for selecting reliable

identification parameters in the first instance, nor do they excuse the examiner from performing a robust assessment of the circumstances around the subject order activity. This statistical analysis is conclusory, and reporting averages and medians does nothing to demonstrate that all of the sequences captured by Prof. Venkataraman's methodology exhibit spoofing characteristics, as would be the case if a reliable approach had been used. For example:

a. *Alleged Spoof Order Size*. Prof. Venkataraman calculated the average size of Mr. Nowak's alleged spoof orders to be 67 contracts and implied with no support that this average size is evidence that the entire population of sequences involves spoofing. Furthermore, even if an average size of 67 contracts hypothetically supported an inference of spoofing for some other trader, Mr. Nowak's OTC gold options trading would have required him to regularly place delta hedge orders in the gold futures market of that size and larger. To provide important context, I analyzed the Athena records of OTC trades executed by Mr. Nowak between 2010 and 2014. During this period, Mr. Nowak's OTC transactions that had meaningful delta requirements had an average futures-equivalent delta of 123 contracts, meaning that his hedging needs would, on average, regularly require him to trade in sizes almost twice as large as what Prof. Venkataraman claims is excessively large. Between 2010 and 2014, Mr. Nowak executed 11,962 OTC gold transactions that had delta equivalent risk that was greater or equal to 67 contracts.

b. *Median Order Durations of Alleged Spoof Orders.* Prof. Venkataraman calculated the median duration of all alleged spoof orders (for Defendants and cooperating witnesses), in the aggregate, to be 1.5 seconds, and implied that this median duration was short enough to support an inference of spoofing across the whole population of alleged spoofing sequences.[11] Again, Prof. Venkataraman presented this number without any context, which is crucial here, as the median duration of orders market-wide during this period was 1.4 seconds, and the median duration of Mr. Nowak's alleged spoof orders was 3.5 seconds, more than *twice* the length Prof. Venkataraman claims is short enough to support an inference of spoofing. Even if Prof. Venkataraman had established that a median duration of 1.5 seconds (or 3.5 seconds

[11] Venkataraman Decl., p. 12.

for Mr. Nowak) supported an inference of spoofing across the entire population of selected sequences, which he did not, he certainly has not established that all the alleged spoof sequences with durations between 3.5 seconds and 82.3 seconds (the maximum duration of an alleged sequence order under Prof. Venkataraman's criteria) are consistent with spoofing. In fact, 70% of Mr. Nowak's alleged spoof sequences had durations of five seconds or longer, and 46% had durations of ten seconds or longer. These long trading sequences disproportionately contribute to the loss calculation because Prof. Venkataraman considers all trading activity that took place during the entire course of the alleged spoofing sequence. Nearly half (46.8%) of the alleged spoof orders in these sequences had durations of five seconds or longer, which Prof. Venkataraman's criteria would not have identified as spoofing in the *Bases* case, accounting for approximately 50% of the unadjusted loss amount attributed to Mr. Nowak.

c. *Proximity of Alleged Spoof Orders and Opposite Orders.* Prof. Venkataraman included as one of his selection criteria that alleged spoof orders and opposite orders must be in the top ten levels of the order book when they are placed, as opposed to the top five levels in the *Bases* case. As an initial matter, orders placed deeper in the order book (e.g., levels six - ten) are less likely to be meaningful to market participants, and therefore less likely to induce anyone to trade. As a result, these orders are much less likely to be placed as part of a spoofing strategy. Furthermore, Prof. Venkataraman applies no order proximity criterion and allows for the alleged spoof and opposite order to be extremely far apart from one another, which does not support the inference that the alleged spoof order was placed to cause the execution of the opposite order. Among the alleged spoofing sequences identified by Prof. Venkataraman, there were 163 where the best-priced alleged spoof order was ten ticks or more away from the opposite order at the time it was placed. There were also 72 sequences where the best-priced alleged spoof order was 20 ticks or more away from the opposite order when the alleged spoof order was placed, and, in some of

these instances, the orders were over 100 tickets apart.[12] Inclusion of these sequences demonstrates how divorced from accepted notions of spoofing Prof. Venkataraman's screening criteria are.

d. *Market Imbalances Purportedly Caused by Alleged Spoof Orders.* Prof. Venkataraman did not establish that any of Mr. Nowak's alleged spoof orders caused market imbalances, but even if he had, there is nothing remarkable or inappropriate about creating an order imbalance in the gold futures market, as, on average, market imbalances occurred 4,000 times per day during the relevant period. Nevertheless, Prof. Venkataraman asserted that the total size of the alleged spoof orders "*significantly changes the imbalance in the visible order book*,"[13] based on nothing more than his unsubstantiated observation that Mr. Nowak placed what he considers large visible orders, and implied that this supports an inference of spoofing across the entire population of sequences. In fact, there are 9,124 alleged spoof scaled order groups associated with the 6,063 alleged Nowak spoofing sequences, and of those, 41.5% did not cause an imbalance in the top five levels of the market order book.

e. *Low Fill Rates of Alleged Spoof Orders*. Prof. Venkataraman calculated the average fill rate of Mr. Nowak's alleged spoof orders to be 2.6%, implied that this is abnormally low, and suggested that this value supports an inference that the entire population of selected sequences involves spoofing. This fill rate is, in fact, *artificially* low, because it relies on 1) analyzing the fill rate of each order within a scale independently, despite the fact that all the orders comprising a given scale are placed together as part of the same strategy and are expected to have different fill rates depending on their market depth, and 2) excluding aggressively priced orders within those scales. When the fill rates of the *scales*, rather than the fill rates of each constituent order, are calculated and aggressively priced orders are not artificially

[12] Along these lines, Prof. Venkataraman also included alleged spoof and opposite orders that were not even visible to the market. Before August 9, 2009, the visible order book in precious metals futures was only five levels deep on each side of the market. Prof. Venkataraman acknowledged this in his declaration, but he still attempted to include alleged spoof orders and opposite orders that were not visible to the market (i.e., up to a theoretically defined tenth level). It is not reasonable to assume that an order that was placed outside the visible order book was placed for purposes of spoofing the market into trading with an order on the opposite side, because an order that is not visible to other market participants cannot induce them to do anything at all.

[13] Venkataraman Decl., p. 11.

excluded, 22% of Mr. Nowak's scales that Prof. Venkataraman considers spoof orders received fills.

B. Prof. Venkataraman's Methodology Does Not Rule Out Legitimate Economic Rationales for Trading in the Four-Step (Now Two-Step) Pattern

29. Because he applied such broad selection criteria, many of Prof. Venkataraman's alleged spoofing sequences are consistent with legitimate trading strategies, and he has done nothing to eliminate rational alternative explanations for Mr. Nowak's trading or to consider what Mr. Nowak's trading should look like given his business strategies as an options trader. To provide an example, an options trader like Mr. Nowak uses the futures market (among other markets) not to fill client orders, but to hedge risk associated with his options book, like "delta" risk. Delta is an estimate of how much the value of the portfolio (or individual option) will change based on a $1 increase in the underlying commodity. Options traders will typically attempt to maintain a particular level of delta (e.g., if an options trader attempts to maintain a "delta neutral" portfolio, he tries to position his portfolio of futures and options so that a $1 increase in the commodity will not have any P&L effect on his portfolio). The desire to maintain a specific delta means that any time the price rises above a certain level, the trader will need to sell futures, and any time the price dips below that level, the trader will need to buy futures. He might use different order types to achieve this purpose, including visible scales and iceberg orders. This is a natural reason why a trader like Mr. Nowak would have orders on both sides of the order book at different prices. Much of Mr. Nowak's trading that has been identified as spoofing by Prof. Venkataraman is consistent with this common options risk management strategy, yet Prof. Venkataraman has done nothing to show, especially in the absence of more narrowly tailored spoofing selection criteria, that it is not an equally likely or more likely explanation for Mr. Nowak's activity than spoofing.
30. Many economically rational trading techniques, including placing large visible orders for price or liquidity discovery or placing orders to capture price sweeps, among others, could appear to be consistent with the activity Prof. Venkataraman has identified as spoofing for Mr. Nowak, and he has provided no data or analysis to rule out these strategies as legitimate alternative explanations. In lieu of this missing analysis Prof. Venkataraman simply declares that the sparse criteria used to identify his alleged spoofing sequences are "*inconsistent with*

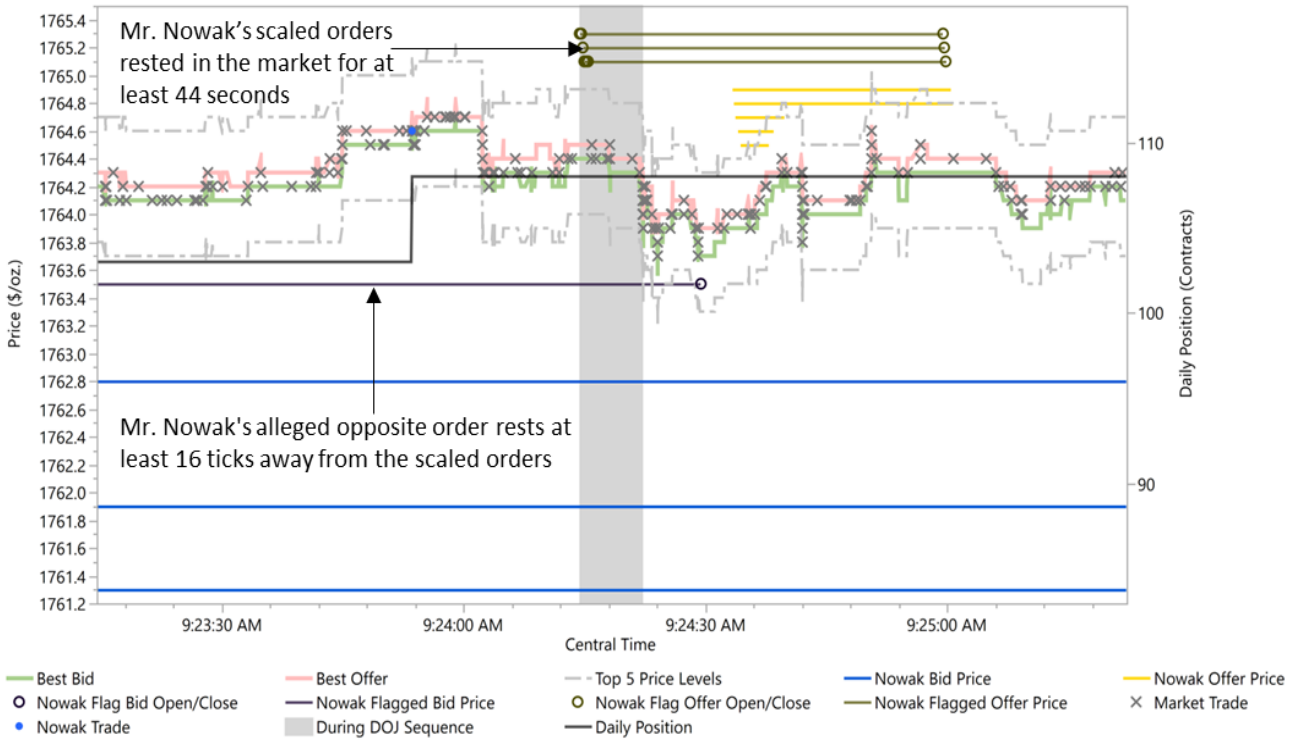
an economically rational trading strategy aimed at obtaining fills for the identified Spoof Orders."[14] However, in my opinion and based on my expertise, the characteristics of many trades that Prof. Venkataraman deemed illegitimate are in fact entirely consistent with a variety of economically rational trading strategies, including those that are standard for options traders.

C. Prof. Venkataraman's Spoofing Selection Criteria Capture Extreme Scenarios That Are Clearly Inconsistent with Spoofing

31. Examination of Mr. Nowak's individual alleged spoofing sequences demonstrates that Prof. Venkataraman's overinclusive selection criteria have, indeed, swept in trading that is entirely inconsistent with spoofing. The inclusion of these decidedly non-spoofing sequences underscores the unreliability of Prof. Venkataraman's selection criteria for identifying spoofing. Such sequences would not have been captured by a reliable methodology.
32. Sequence Nowak_GC_S_2430 from October 12, 2012, provides an example where Mr. Nowak's alleged spoof orders and opposite orders were at least 16 ticks apart. Mr. Nowak's alleged spoof orders also rested in the market for at least 44 seconds. In my opinion, the data does not provide any reasonable basis to infer that Mr. Nowak placed those orders with the unconditional intent to cancel them, both because the orders on either side of the market were so far apart that one cannot justifiably assume they were connected and because the alleged spoof orders were available in the market for so long it would be irrational to infer that Mr. Nowak intended to cancel them before execution.

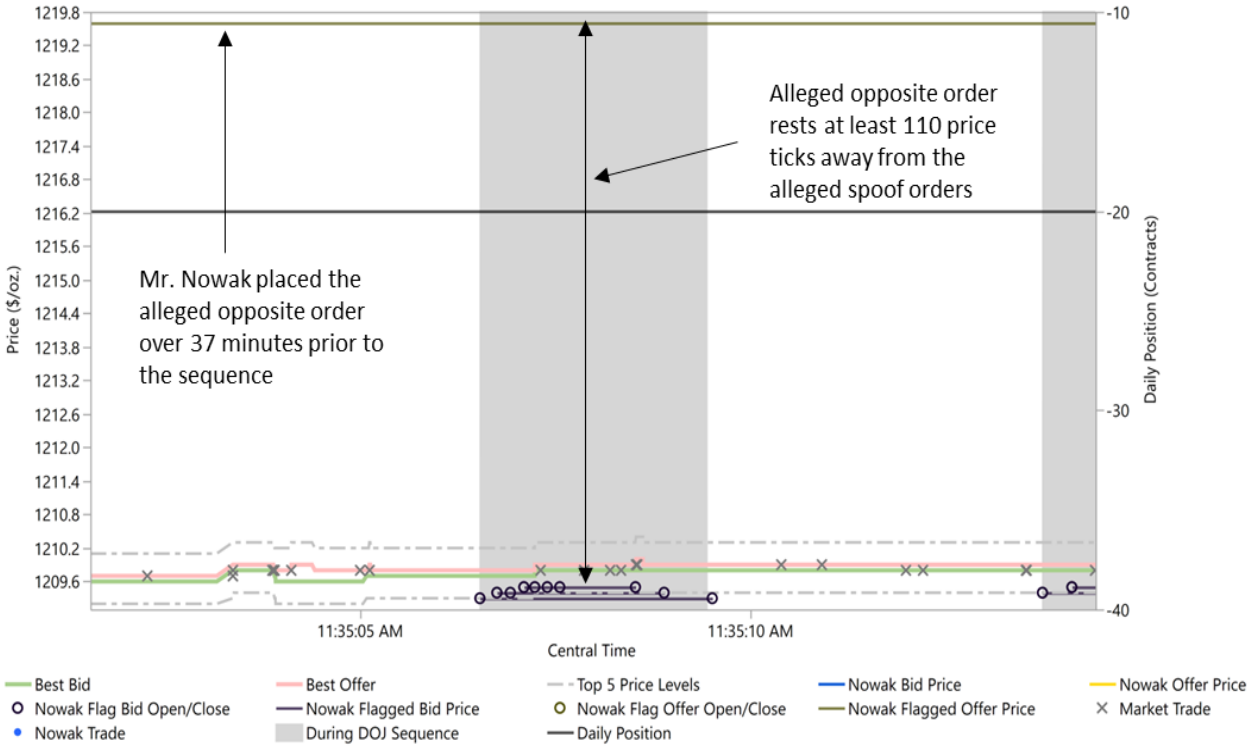
[14] Venkataraman Decl., p. 13.

Figure 1 – Nowak_GC_S_2430 Activity



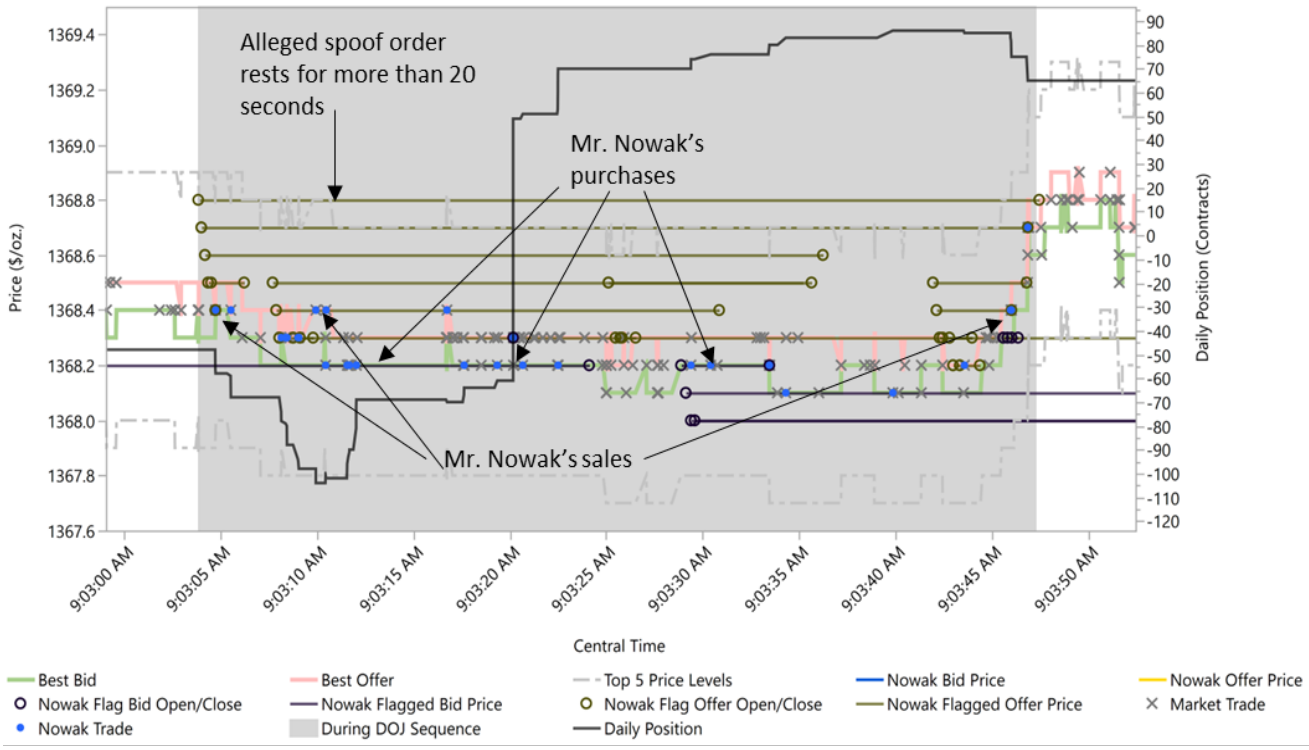
33. In sequence Nowak_GC_B_427 from July 1, 2010, Mr. Nowak placed seven scaled ten lot orders in the top five levels of the order book. He then canceled six of these orders, and subsequently placed four additional ten lot orders in the top five levels of the order book. Prof. Venkataraman flagged an opposite order in this sequence that was at least 110 ticks away from Mr. Nowak's scaled orders. This opposite order was also placed over 37 minutes before the start of this sequence. During those 37 minutes, Mr. Nowak submitted 11 orders, canceled eight orders, and received 30 lots of fills. When two market actions are so distant in time and the trader is active in the market doing other things during the intervening period, there is little reason to believe that the purposes of those two actions are related.

Figure 2 – Nowak_GC_B_427 Activity



34. Sequence Nowak_GC_S_861 from December 17, 2010, provides an example of Prof. Venkataraman ignoring the basic circumstances around the sequences his methodology flagged. As the plot below shows, Mr. Nowak was actively trading and using aggressive orders on both sides of the market, but Prof. Venkataraman disregarded the trading in both directions and failed to recognize that some of Mr. Nowak's scaled orders were either aggressive or rested in the market for at least 20 seconds, all of which undercuts any inference of an unconditional intent to cancel.

Figure 3 – Nowak_GC_S_861 Activity



The black line that moves throughout the plot shows Mr. Nowak's daily position and indicates purchases when it moves higher and sales when it moves lower

35. There are many other examples of Mr. Nowak's trading activity, similar to the sequences presented above, that Prof. Venkataraman's methodology unreasonably classified as spoofing activity. These examples confirm that Prof. Venkataraman's methodology cannot reliably distinguish between potential spoofing and legitimate trading. Prof. Venkataraman did not offer any analysis of the facts and circumstances surrounding any individual sequence that would allow one to infer Mr. Nowak had the intent to cancel the orders prior to execution, especially when the characteristics of those orders were inconsistent with general spoofing theory.

V. METHODOLOGICAL FLAWS IN PROF. VENKATARAMAN'S CALCULATION OF LOSS

36. Prof. Venkataraman claims to have calculated the loss associated with Mr. Nowak's alleged spoofing, but his methodology suffers from numerous flaws that prevent it from providing a reasonable estimate of potential market harm. He attempts to calculate loss by comparing the price of every single trade that occurred while the alleged spoof orders were active to a price at which he claims those trades would have occurred "but-for" the presence of Mr. Nowak's orders. However, this assumes, without basis, that Mr. Nowak's alleged spoof orders caused 100% of the price moves in the market. Further, he does not provide evidence to support the actual availability of the "but-for" prices. He then purports to account for the fact that "not every market participant would have alternatively traded at the But-For Trade Prices," but "[r]ather, some market participants may choose to cross the spread anyway," and that "[b]est prices may also move absent Spoof Order pressure, even within a short period of time"[15] by adjusting his loss estimate in two separate ways. His adjustments rely on the comparison of the alleged spoofing sequences to so-called "control periods" that immediately precede them, a method that is not designed to fulfill the aims Prof. Venkataraman claimed were the reason for adjusting loss in the first place. The second of these approaches, the alternative loss adjustment, purports to compare rates of spread-crossing during the alleged spoofing sequences and their "control periods" to remove the "spread-crossing trades that would have occurred" regardless of Mr. Nowak's alleged spoof orders. However, as applied, his approach does not actually analyze spread-crossing, and it ignores the rate at which the market response to the imbalances supposedly caused by Mr. Nowak's alleged spoof orders dissipates. Moreover, it does not actually compare the alleged spoofing sequences to their corresponding control periods.

[15] Venkataraman Decl., p. 20.

A. Prof. Venkataraman's Loss Calculation Does Not Establish That Alleged Spoof Orders Caused Harm to Market Participants, Particularly for the Large Number of Alleged Victims Who Did Not Cross the Spread to Trade

37. As an initial matter, despite describing his "alternative adjustment" as comparing rates of spread-crossing during the control periods and the alleged spoofing sequences,[16] Prof. Venkataraman's "spread-crossing rates" do not measure actual spread crossing. Instead, they merely calculate the number of lots that traded at a "worse" price compared to Prof. Venkataraman's purported but-for price, regardless of whether or not the alleged victim actually crossed the spread to trade during the alleged spoofing sequence.
38. In fact, 42% of Prof. Venkataraman's control period "spread-crossing" trades and 40% of his alleged spoofing sequence "spread-crossing" trades did not involve actual spread-crossing. This is a serious problem for Prof. Venkataraman's assumption that alleged spoof orders *caused* harm to market participants by inducing them to trade at worse prices than they otherwise would have. Even if Prof. Venkataraman had established that the alleged spoof orders, rather than other market activity, caused alleged victims to cross the spread during the alleged spoofing sequences, which he did not for reasons I will explain below, he certainly cannot establish that alleged spoof orders caused loss to purported victims who *did not even cross the spread to trade*. If anything, the alleged spoof orders would make transactions like this *less* likely, not more likely. Under Prof. Venkataraman's theory, if the alleged spoof order was a bid, it would signal to the market that the price was going to move up, meaning that a seller would be foolish to cross the spread and a hit a bid rather than wait for the market to reach his (higher) offer. Thus, if the alleged spoof bid had any effect, it would have *inhibited* the seller from trading with the bid, and thus *inhibited* the transaction from taking place at the "worse" price, which is the opposite of causation. Approximately 20% of Prof. Venkataraman's estimated unadjusted market losses ($1,552,350) are derived from trades that were not actually spread-crossing trades.
39. While Prof. Venkataraman's "spread-crossing" rate *includes* non-spread-crossing trades that should have been excluded, it also *excludes* 39,002 spread-crossing trades from his totals during control periods that should have been included (32% of his calculated total). He

[16] Venkataraman Decl., p. 25.

apparently excludes these trades because they occurred at better prices relative to his but-for price. Omitting them from his analysis unambiguously understates the amount of spread-crossing that would have otherwise taken place and overstates the price impact of the alleged spoof orders.

40. Even when alleged victims crossed the spread during the alleged spoofing sequences, Prof. Venkataraman has done nothing to prove that the alleged spoof orders *caused* this spread-crossing. He merely assumes causation. He has made no attempt to distinguish between market participants who crossed the spread because of the alleged spoof orders and market participants who crossed the spread for any number of other reasons, including other market activity, individual trading strategy, or movements in correlated markets. Given the varied reasons that may lead to a trading decision, including the decision to cross the spread, it is not reasonable to assume, from the limited information Prof. Venkataraman has provided, that Mr. Nowak's alleged spoof orders induced market participants to cross the spread during these sequences.

41. The data prove the unreasonableness of the assumption that Mr. Nowak's orders caused harm to market participants across the entire population of Prof. Venkataraman's alleged spoofing sequences. Over 30% of the sequences Prof. Venkataraman has identified demonstrate characteristics that are inconsistent with the claim that the alleged spoof orders induced market participants to trade or that the alleged victims sustained financial harm as a result of trading. Of the 132,265 alleged spoofing sequences 18,908 involved no spread-crossing trades and an additional 21,133 involved less than or equal spread-crossing as compared with their corresponding control periods (i.e., under the logic of Prof. Venkataraman's methodology, the market was not responding to the alleged spoof orders, and the loss associated with those sequences should be zero).[17] I discuss this last flaw in greater detail below.

42. The outcomes associated with these 40,041 sequences are important because they highlight the lack of support for the assumptions underlying Prof. Venkataraman's methodology as a whole, thereby challenging his claims as to the remaining 82,224 or 69.7% of his selected

[17] (18,908 + 21,133) / 132,265 = 30.3%. There were 40,041 alleged spoofing sequences where the spread-crossing volume during the control period was greater than or equal to the spread-crossing volume during the spoofing sequence. 21,133 of these sequences were mutually exclusive of the sequences that did not have spread-crossing trades during the spoofing sequence.

sequences. He did not provide any basis for establishing a causal link between spread-crossing and the alleged spoof orders in the remaining 69.7% of sequences, nor did he provide a basis for establishing that market participants crossing the spread would be harmed because of the alleged spoof orders in the sequences.

B. Prof. Venkataraman's Adjusted Loss Calculations Are Based on a Deeply Flawed Selection of Control Periods

43. Prof. Venkataraman adjusted his initial "unadjusted" calculation of loss in two different ways to yield two different loss calculations: the "adjusted" methodology and the "alternative adjusted" methodology. Both adjustments relied on comparing trading during the alleged spoofing sequences with trading during "control periods" of purportedly—though, as my analysis illustrates, not consistently—equal duration that immediately preceded each spoofing sequence. This general approach is deeply flawed for numerous reasons, including because:

    a. *Prof. Venkataraman Included Control Periods Not Equal in Duration to Their Associated Alleged Spoofing Sequences.* Prof. Venkataraman included periods that were not equal in duration to their corresponding alleged spoofing sequences. For 19,957 of Prof. Venkataraman's 132,265 alleged spoofing sequences (917 of the 6,063 alleged spoofing sequences for Mr. Nowak), he used a control period that was shorter in duration than the alleged spoofing sequence.[18] In his declaration, Prof. Venkataraman explained that he cut off control periods if they overlapped with another alleged spoofing sequence in his "But-For" methodology.[19] He then presented a calculation that he claims adjusts the rate of spread-crossing to account for the shorter period. However, Prof. Venkataraman does not appear to address the shorter control periods in his alternative adjusted methodology.[20] Ultimately, his alternative adjusted methodology results in control periods that are 129,729 seconds

[18] 529 of the 917 sequences had control periods that were less than half the duration of the associated spoofing sequence.
[19] Venkataraman Decl., p. 21.
[20] As Prof. Venkataraman ultimately relies on a per-second rate of spread-crossing in his alternative adjusted methodology, for each individual sequence, his extrapolation method would arrive at the same result as if he did nothing at all. The way in which he aggregates rates of spread-crossing across all sequences would lead to his extrapolation method producing arbitrary impacts on the aggregate results based on relative length of sequences rather than any real rates of spread-crossing, so the extrapolation method wouldn't be appropriate for use here.

(18.2%) shorter than the alleged spoofing sequences. This is notable because shorter control periods are likely to exhibit less overall spread-crossing (and trading in general), which, by comparison will make the (longer) alleged spoofing sequences appear to exhibit higher relative rates of spread-crossing, for purposes of Prof. Venkataraman's alternative loss adjustment. It should also be noted that Prof. Venkataraman has chosen to truncate his control periods because they overlap with activity that nobody but him has determined to be spoofing. In fact, the alleged Nowak spoofing sequences for which Prof. Venkataraman has assessed the highest and third highest market losses each have control periods that are shorter than the corresponding spoofing sequence. These are sequences Nowak_GC_S_2852 and Nowak_GC_B_3257, with adjusted market loss estimates of $52,132 and $35,483, respectively. For Mr. Nowak, these types of sequences (i.e., where the control periods are shorter than their associated alleged spoofing sequences) represent $873,489 (or 23.4%) of Prof. Venkataraman's $3,726,401 calculated alternative adjusted market loss.

b. *Despite Prof. Venkataraman's Alternative Adjustment for Loss, He Included Losses from Control Periods That Actually Exhibit Higher Rates of Spread-Crossing Than Their Corresponding Alleged Spoofing Sequences*. Prof. Venkataraman's alternative adjustment for loss relies on "comparing the rates of spread-crossing during the Spoofing Sequence and during a similar duration control period."[21] Yet over a third (33.9%) of the 112,308 alleged spoofing sequences that had the same duration as their associated control periods (27.7% of the 5,146 sequences for Mr. Nowak) had control period spread-crossing volumes that were higher than or equal to the spread-crossing volumes of the corresponding spoofing sequences.[22] Prof. Venkataraman calculated a total of $2,926,222 in alternative adjusted market losses for Defendants and cooperating witnesses ($193,712 for Mr. Nowak) during these sequences, when there should not have been any market loss, because the spread-crossing, which is how Prof. Venkataraman calculated harm to the market, actually declined or was the same

[21] Venkataraman Decl., p. 25.

[22] There are 112,308 sequences where the control period was the same duration as the spoofing sequence. In 38,061 of these, the spread-crossing volume during the control period was greater than the spread-crossing volume during the spoofing sequence.

during the spoofing sequences relative to the control periods. For example, in alleged spoofing sequence Nowak_GC_S_2533, Prof. Venkataraman claimed that there were 31 more spread-crossing trades during the control period than during the alleged spoofing sequence. However, he still assessed adjusted market losses of $16,969 for this sequence. The difference in control period spread-crossing is even more pronounced in alleged spoofing sequence Nowak_GC_B_3194. In this instance, Prof. Venkataraman claimed there were 567 more spread-crossing trades during the control period than during the alleged spoofing sequence, and yet he still assessed adjusted market losses of $11,280. Based on Prof. Venkataraman's methodology, a decrease in spread-crossing during the alleged spoofing sequences relative to the control periods suggests that no excess spread-crossing occurred and, therefore, there was no harm to market participants as a result of Mr. Nowak's activity.

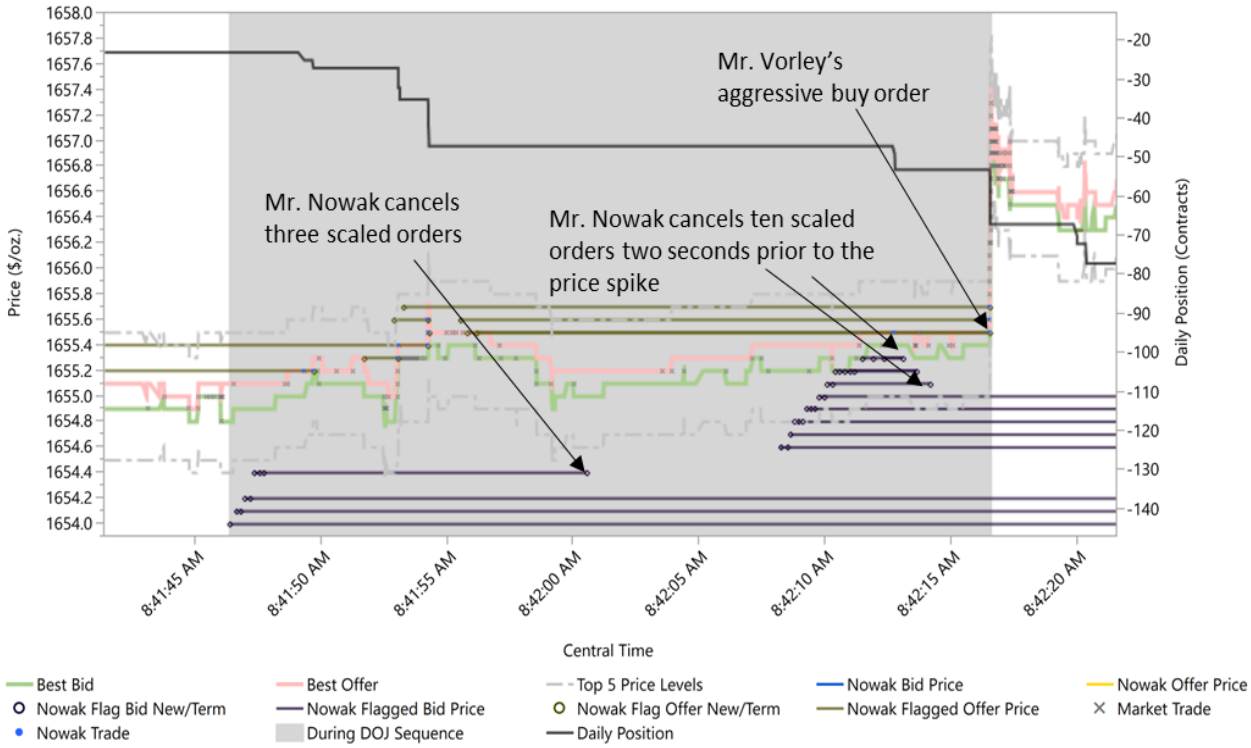
c. These basic flaws of control periods of unequal duration and control periods that exhibited more or equal spread-crossing as compared with their associated spoofing sequences led Prof. Venkataraman to attribute $1,067,201 in alternative adjusted market losses to Mr. Nowak that should not have been assessed as losses. This represents an error of 28.6%, before even considering the additional logical and theoretical flaws in the design of the methodology.[23]

d. *Prof. Venkataraman's Selected "Control Periods" Do Not Predict Activity in Subsequent Time Periods.* Prof. Venkataraman selected as his control periods the snippets of time immediately preceding the alleged spoofing sequences, because he erroneously assumed that trading activity in the market during the short time period before the alleged spoofing sequences would predict activity during the alleged spoofing sequence. In fact, due to the high price volatility and temporal irregularity of trading in the gold futures market, trading in one snippet of time does not predict trading in a subsequent snippet of time, even absent spoof orders. During the relevant period, when the market did trade in a given second, which it only did about 25% of the time, only 7% of the time did it trade the same volume as it did in the immediately preceding second. As such, there is no reasonable basis to claim, as Prof. Venkataraman does, that a control period, selected only based on proximity in time to

[23] $873,489 + $193,712= $1,067,201. $1,067,201 / $3,726,401 = 28.6%.

the alleged spoofing sequence, would have any comparative or predictive value. Even more troublingly, Prof. Venkataraman did nothing to account for or mollify the effects of control periods that exhibited price moves, either minor or extreme, meaning that if there happened to be a major downward sweep during the control period, for example, all the trading in the subsequent alleged spoofing sequence would appear artificially high by comparison. Review of the March 21, 2012, alleged spoofing sequence Nowak_GC_B_2559 highlights how Prof. Venkataraman's control period methodology leads to artificially high estimates of market loses. Figure 4 (below) shows that in the seconds immediately preceding the alleged spoofing sequence (i.e., within the control period), the market was trading within a range of a couple ticks. Mr. Nowak entered the market and placed a scaled order group on the bid side of the market. After 14 seconds, he partially canceled that scaled order group, and several seconds after those cancelations he placed additional scaled orders at improved prices. Mr. Nowak again canceled almost half of the orders in his scale. Two seconds after he canceled those orders, a trader at another bank, James Vorley, entered an aggressive order to buy 100 lots. Mr. Vorley's trading triggered several stop orders and the market moved up $1.90, or 190 ticks. Prof. Venkataraman's methodology improperly attributes the price move following Mr. Vorley's order to Mr. Nowak's order activity because similar price volatility didn't occur during his control period. Prof. Venkataraman estimated an adjusted market loss of $42,932 for this single sequence.

Figure 4 – Nowak_GC_B_2559 Activity



e. *Prof. Venkataraman Did Not Compare Control Periods to Their Corresponding Alleged Spoofing Sequences, Eliminating Any Marginal Predictive Value They Could Have Had.* Prof. Venkataraman's method for comparing control periods to their corresponding alleged spoofing sequences to calculate his alternative loss adjustment ensured that any possible predictive value was entirely removed. Prof. Venkataraman did not compare the activity during each individual control period with its subsequent associated spoofing sequence, as one would reasonably expect. Instead, for reasons unexplained, he simply aggregated all 132,265 control periods, (for all alleged spoofing sequences across all Defendants and cooperating witnesses) and the spread-crossing trades during those periods, and divided the total number of contracts traded as a result of spread-crossing in a single direction by the aggregate duration of those sequences, to arrive at a single control period rate of spread-crossing: 2.50 contracts

per second.[24] For the reasons discussed above, Prof. Venkataraman's control period analysis does not provide a reliable basis for assessing market impacts associated with alleged spoofing orders. However, even if one were to accept his flawed approach, conducting an analysis in this aggregate manner thwarts any comparison between alleged spoofing sequences and their control periods and prevents him from evaluating the "idiosyncratic" factors that he believes might be driving market activity at any particular point in time, which he claims is the goal of this analysis.[25]

44. In Section VI below, I present an alternative framework for calculating theoretical loss, addressing certain of the errors and flawed assumptions in Prof. Venkataraman's methodology. My proposed alternative methodology is grounded in actual analysis of market responses to order book imbalances in the gold futures market.

C. Prof. Venkataraman's Selected But-For Prices Misrepresent a Realistic Alternative Scenario and Overstate Potential Market Losses

45. Prof. Venkataraman selected but-for prices to assess market loss that do not represent realistic levels at which alleged victims would have traded but-for Mr. Nowak's alleged spoof orders, and therefore, do not provide a meaningful baseline from which to assess potential loss associated with Mr. Nowak's trading activity.

46. Prof. Venkataraman assumed that the alleged victims would have been able to trade at the prevailing best bid or offer in the market, depending on which side of the market they were on (i.e., if the alleged victim was a buyer, he assumed they would have received the best bid, if the alleged victim was a seller, he assumed they would have received the best offer), before the placement of an alleged spoof order. This is a false premise for several reasons. First, if a market participant wanted to place an order at the best bid or offer prior to the placement of an alleged spoof order, they certainly could have, but there is no reason to assume that they would have been able to trade at that price. A buyer receiving the best bid relies on a seller choosing to cross the spread and trade with the open order at that price, but there is no reason

[24] Prof. Venkataraman identified 1,461,154 contracts that traded as the result of spread-crossing in a single direction. The aggregate duration of these control periods was 584,484.892 seconds. 1,461,154 contracts / 584,484.892 seconds = 2.5 contracts per second.
[25] Venkataraman Decl., p. 22.

to assume the seller would have chosen to cross the spread, rather than waiting for the market to trade up to his level. In fact, only 31% of orders placed at the best bid or best offer price receive fills. The only reliable but-for trade price, therefore, would have been the prevailing price *across* the spread prior to the placement of an alleged spoof order, because the price across the spread represents an open order on the opposite side of the market available for execution. If, more appropriately, the best price on the *opposite* side of the market was used, the traders in question would still have crossed the spread and would have been no worse off than they were trading during the alleged spoofing sequence (assuming the best bid or offer didn't change).[26]

D. There Is No Basis for Including Executed Trades up to the Full Duration of the Alleged Spoof Order in the Calculation of Market Loss

47. Prof. Venkataraman's analysis calculated market losses for any fills that were executed while an alleged spoof order was resting in the market if the fill was at a price other than the purported but-for price, without producing any data to support his assumption that the market impact of an alleged spoof order may persist for that length of time, which could be up to 82.3 seconds based on his selected parameters. He even includes losses from trades that occur *before the alleged spoof order reaches his 30 lot spoof order threshold*. Assessing market losses over such extended time periods conflicts with how these markets respond to the arrival of an order book imbalance. As I will discuss below, the vast majority of any increased spread-crossing occurs within the first 100 milliseconds of an imbalance being established. This occurs in the market generally, and in the case of imbalances purportedly caused by Mr. Nowak's alleged spoof orders.
48. Rather than assume, as Prof. Venkataraman does, that the impact of an order imbalance persists for the full duration of the order or sequence, I analyzed all market-level order book imbalances that occurred in the top five levels of the order book during the Nowak Period in

[26] Even if this more reliable "but-for" price were used, there is still no certainty that the demanded quantity of contracts would be available at this price. The market participant in question may very well have their order partially filled at this level but have to fill the remainder of their order at the next best price.

gold futures contracts for the dates on which Mr. Nowak was active.[27] I then identified trades taking place on the side of the market opposite the imbalance and calculated duration from the time the imbalance was established until the trade took place, and found that in the first tenth of a second after the emergence of the imbalance, 73.3% of fills occurred on the side opposite the imbalance (i.e., 23.2% rate of excess spread-crossing, as the expected rate of spread-crossing, absent an imbalance, is approximately 50% of trades being aggressed from each side). Between 0.1 and 1.0 seconds after the emergence of the imbalance, 59.4% of fills occurred on the opposite side (i.e., 8.9% excess rate of spread-crossing). Between 1.0 and 2.0 seconds after the emergence of the imbalance, 53.7% of fills occurred on the opposite side (i.e., 3.6% excess rate of spread-crossing). The below table shows fill rates during market imbalances for both sides.

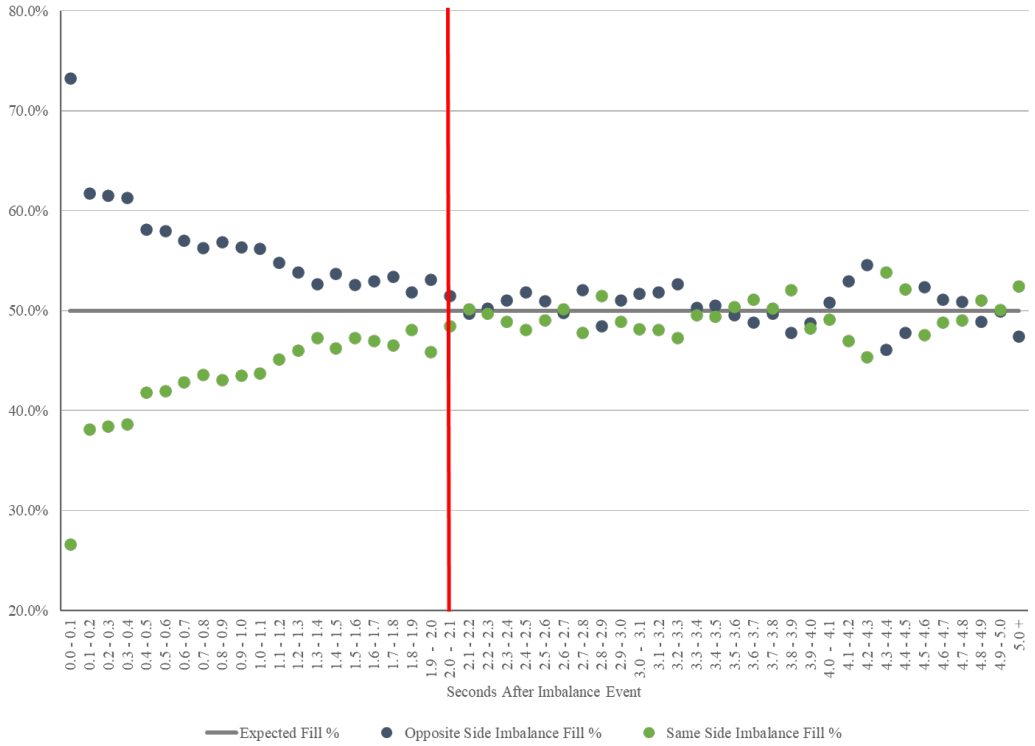
Table 1 – Fill by Aggressive Side During Market Imbalances

Analysis of Fills During Imbalances in the Top Five Price Levels							
Seconds	Opposite-Side as the Imbalance		Same-Side as the Imbalance		Other Fills		Total Fills
	Fills	Percent	Fills	Percent	Fills	Percent	
0.0 - 0.1	1,028,806	73.3%	373,775	26.6%	1,291	0.1%	**1,403,872**
0.1 - 1.0	1,049,710	59.4%	717,954	40.6%	962	0.1%	**1,768,626**
1.0 - 2.0	425,314	53.7%	365,250	46.1%	911	0.1%	**791,475**

49. Figure 5, presented below, plots the aggressive side of trades following the emergence of market-level order book imbalances. After two seconds, the market trades almost equally on both sides of the market; thus, any assumed response to the order book imbalance has dissipated by that point.

[27] I analyzed only imbalances that resulted from market participants increasing the quantity available on the side that was or became the large side of the imbalance, since this would be theoretically similar to the alleged spoofing activity. This methodology captures both relatively small and extremely large depth changes over the imbalance threshold. This analysis uses all market imbalances and presents average numbers based on hundreds of thousands of imbalances and should therefore be considered to be robust.

Figure 5 – Market Imbalance Fills Over Time

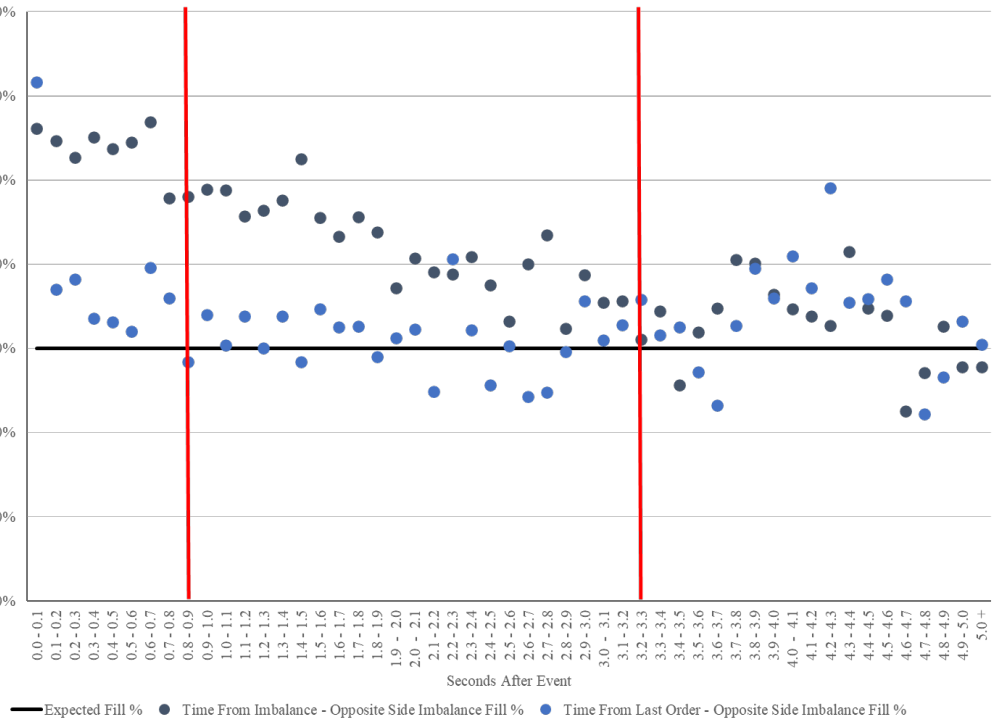


50. To ensure that my findings regarding market-wide imbalances may fairly apply here, I analyzed the imbalances allegedly caused by Mr. Nowak's spoof orders and found the rate to be very similar to the rate of response to imbalances in general. I applied a similar methodology, but to ensure this analysis was robust and reflected actual market conditions, I began counting fills at two different points in time. First, I started counting fills once the aggregate quantity of Mr. Nowak's scaled orders reached the 30 lot threshold used in Prof. Venkataraman's screening criteria.[28] Second, I began counting fills after the last order in Mr. Nowak's scaled order group was placed. Figure 6 presented below shows the percentage of spread-crossing trades that were being aggressed from the side of the alleged spoof orders during the sequences flagged by Prof. Venkataraman. As evidenced by this plot, during Mr. Nowak's alleged spoofing sequences, excess spread-crossing dissipated (i.e., the market returned to 50% spread-crossing in each direction) within 3.2 seconds of the 30 lot size threshold being reached or within 0.9 seconds of the last order in Mr. Nowak's scaled being

[28] In addition to having 30 lots on the alleged spoof side of the market, the alleged spoof side needs to be twice as large at the small side.

placed. This result is consistent with the generalized market-level results presented above where, on average, the observed excess spread crossing ceased after two seconds of an imbalance initiation.

Figure 6 – Market Imbalance Fills Over Time During Alleged Spoofing Sequences



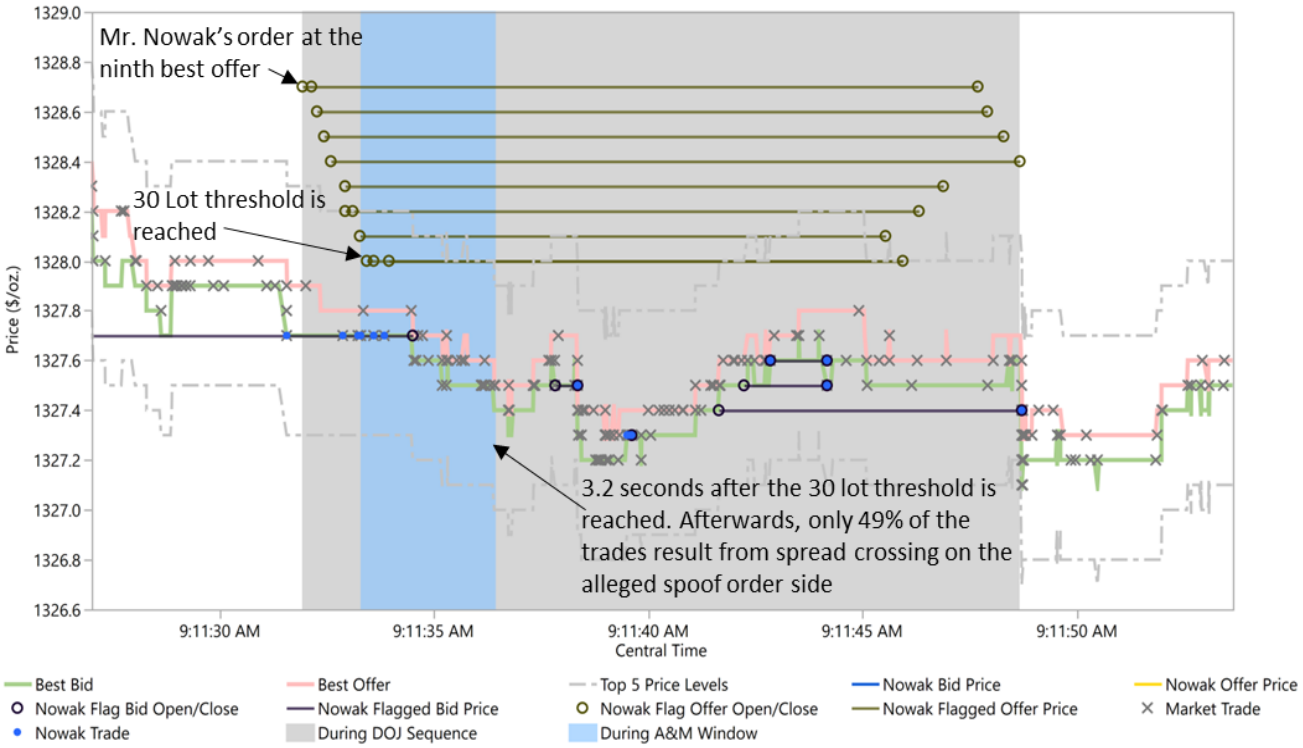
51. Prof. Venkataraman did not undertake any analysis, like the one presented above, to assess the actual impact of the alleged spoof orders, nor did he attempt to assess the duration of any assumed impact. His assumption of an impact persisting over the full duration of each alleged spoofing sequence (including for as long as 82.3 seconds) is unsupported by any data he provided and is contradicted by the analysis I performed. As a result, Prof. Venkataraman counts in his loss calculation large volumes of trading activity that took place long after the effects of any market imbalance dissipated and that could not statistically be attributed to the alleged spoof orders.
52. Figure 7, presented below, demonstrates the significant impact of Prof. Venkataraman's unsupported overcounting of fills. This plot shows Mr. Nowak's order activity associated with the alleged spoofing sequence Nowak_GC_S_950 on February 1, 2011. This sequence begins with Mr. Nowak placing 12 ten lot scaled offers, with the first order entering the

market at the ninth best offer (i.e., the ninth level of the order book).[29] He assesses losses from every single trade from the time that the first scaled order is placed (before the 30 lot threshold is met) until the end of the sequence.

53. I applied the methodology described above and began counting market spread-crossing fills once Mr. Nowak had placed 30 visible scaled lots in the top five levels of the order book (at 9:11:33.3), as Prof. Venkataraman should have done. For the following 3.2 seconds (i.e., the average time it takes for excess spread-crossing to cease during the alleged spoofing sequences), 65.4% of the market trades resulted from spread-crossing from the offer side of the market (i.e., traders crossing the spread to sell). As indicated in Figure 7, these are the fills that I have considered as candidates for possible market losses. Prof. Venkataraman continues to assign market losses to trades for an additional 12 seconds. However, from 3.2 seconds to 12 seconds after Mr. Nowak's scaled orders reached a cumulative visible size of 30 lots in the top five levels of the order book, only 49% of the trades resulted from spread-crossing from the side of the alleged spoof orders (154 lots traded out of 314 outright trades). Because the expected rate of spread-crossing from each side at equilibrium is 50%, this demonstrates that any assumed market response to an observed imbalance has dissipated. Nevertheless, I estimate Prof. Venkataraman calculated unadjusted market loss of $24,240 for this period, when the actual value should have been $0.

[29] It should be clear how unreasonable it is to assume, as Prof. Venkataraman has, that a market participant would cross the spread to trade in response to a ten lot order placed at the ninth best offer.

Figure 7 – Market Activity During Nowak_GC_S_950



54. In total, Prof. Venkataraman calculated approximately $4.8 million (approximately 60% of his total) in unadjusted market losses from Mr. Nowak's alleged spoofing sequences that are associated with market trades that occurred either before or after any reasonable assumption can be made that market participants were induced to cross the spread.[30]

[30] By replicating Prof. Venkataraman's methodology I estimate that, of this approximate $4.8 million, $3,203,190 of his unadjusted market losses comes from actual spread-crossing trades, $1,035,800 comes from trades that were aggressed in the opposite direction, and $570,060 comes from instances where two calendar spread orders are matched with each other. CME Group maintains separate order books for outright contracts and calendar spreads. If a market participant elects the functionality, these markets can interact with each other through an "implied market." However, when a calendar spread order matches with another calendar spread order, neither of those orders interacted with the outright contract order book (where Mr. Nowak was placing his orders). Prof. Venkataraman has offered no basis for including matched calendar spread orders in his analysis. Additionally, I estimate that $133,290 of Prof. Venkataraman's unadjusted market loss comes from instances within 3.2 seconds of the 30 lot size threshold being reached where two calendar spread orders are matched with each other. In total, I estimate that $703,350 of Prof. Venkataraman's unadjusted loss number comes from instances where two calendar spread orders are matched with each other.

VI. ALTERNATIVE CALCULATION OF THEORETICAL MARKET HARM

A. Alternative Unadjusted Calculation

55. If the Court nevertheless were to accept Prof. Venkataraman's position that 1) the alleged spoofing sequences may reliably be deemed to constitute spoofing on an aggregate basis, 2) Mr. Nowak's order activity, as opposed to any other market force, *caused* loss to specific market participants, and 3) the market loss from such spoofing sequences is calculable, I offer an alternative methodology that seeks to mitigate many of the serious flaws in Prof. Venkataraman's approach. That analysis begins with Prof. Venkataraman's population of purported spoofing sequences, which is an appropriate starting point because, as explained above, his selection criteria are similar to broad, preliminary spoofing surveillance screening criteria. I have adjusted Prof. Venkataraman's criteria, however, to address the errors and inconsistencies identified in Sections IV and V above. In particular, I apply parameters that narrow Prof. Venkataraman's selected sequences to those that plausibly bear characteristics consistent with spoofing.[31] As a result, I exclude sequences where one or more of the following factors was present: (i) the first cancellation of an alleged spoof order occurred more than five seconds after the placement of the last order in the scaled group (to remove the scale orders with exceedingly long durations that Prof. Venkataraman's criteria swept in); (ii) none of the alleged spoof orders were placed in the top five price levels of the order book (to remove scale orders placed far from the best price in the market); (iii) Mr. Nowak's small-side visible depth was greater than or equal to 30 lots, or scaled orders were on both sides of the market with at least 30 visible lots on each side (to remove sequences with relatively large sizes on both sides of the market where the imbalance-based theory of spoofing does not hold); (iv) the scaled group included at least one aggressive order (to remove scale groups that crossed the spread to trade, clearly demonstrating an intent to transact); or (v) Mr. Nowak placed an aggressive order on the large side while the alleged

[31] This time is conservatively calculated from the time the last order in the group was placed to the time of the first cancellation.

spoof orders were resting (also clearly demonstrating an intent to trade in the direction of the alleged spoofing orders).[32]

56. Prof. Venkatraman calculated a loss for each and every fill that took place during the spoofing sequence. In my opinion, that is not a reasonable approach for at least three reasons: 1) as time passes following the placement of an order, it becomes increasingly unlikely that any observed market activity occurs in response to that order, as I explained in Section V; 2) counting fills that result from a market participant crossing the spread towards the alleged spoof orders is inconsistent with Prof. Venkataraman's already unsupported theory of causation, making any connection to a reliable theory of loss even less tenable[33]; and 3) counting fills when Mr. Nowak was placing orders in a relatively balanced manner is inconsistent with Prof. Venkataraman's theory regarding intent behind the alleged spoofing activity (e.g., causing market imbalances that will elicit a response from other market participants). For purposes of my alternative calculation, I have therefore limited my analysis to fills that resulted from spread-crossing on the side of the alleged spoof order only, when the ratio of Mr. Nowak's visible order volume on the large side and small side was at least 2:1, and where the fills occurred within one of two conservative time periods (as explained in the next paragraph), to capture only fills that *could* be responsive to Mr. Nowak's orders.

57. To address the flawed method of calculating losses for the entire duration of the alleged spoofing sequence, I apply my calculation of the rates at which excess spread-crossing in the wake of Mr. Nowak's alleged spoof orders dissipated (discussed in Section V above) to determine which fills to include in my alternative calculation, yielding a range. For the first approach, I include only the fills that occurred within 3.2 seconds after Mr. Nowak's large-side depth in the top five price levels reached Prof. Venkataraman's 30 lot threshold. For the second approach, I start counting fills at the same point in time but continue counting until 0.9 seconds after the placement of the last order in Mr. Nowak's scaled order group. These two approaches establish the range of fills that theoretically could have resulted from market participants responding to the alleged spoof orders, based on the rate at which the market appears to have responded during the alleged spoofing sequences. While we cannot know

[32] In the *Bases* case, Prof. Venkataraman implemented restrictions using a similar approach to the one I describe here.

[33] I estimate that $1,552,350 of Prof. Venkataraman's unadjusted market loss calculation for Mr. Nowak is derived from trades that were aggressed from the opposite direction of the alleged spoof orders.

exactly when, if at all, a market participant might react in the course of Mr. Nowak's placement of scaled orders, these two measurement points provide a conservative estimate, because the data supports a view that any theoretically reactive trading resolves within or before the end of this time period.

58. In addition, because Prof. Venkataraman's methodology is premised on the importance of market-level order book imbalances,[34] I have included only fills that occurred during sequences in which Mr. Nowak's alleged spoof orders in fact caused a market-level order book imbalance.[35]

59. To address the flaws associated with Prof. Venkataraman's use of the best bid or offer on the same side of the market as the alleged spoof order as a but-for price, I have used the best bid or offer in the market that was resting opposite the alleged spoof orders. For example, if the alleged spoof order was on the bid side of the market, I have used the best offer in the market at the time the alleged spoof order was placed as the but-for trade price. This price more accurately represents a price at which any alleged victim could have traded because it pairs the order in question with another open order on the *opposite* side of the market, as opposed to Prof. Venkataraman's method, which sets the but-for price using the best price of a *competing* buyer or seller on the *same* side of the market.

60. With the above exceptions and modifications, I employ Prof Venkataraman's methodology to calculate unadjusted market loss. For each relevant fill in an alleged spoofing sequence, I identify the actual trade price (as Prof. Venkataraman does) and identify the but-for trade price prior to placement of the alleged spoof orders. I then multiply the difference between the but-for trade price and the actual trade price by the transacted volume. This alternative methodology results in a theoretical unadjusted loss associated with Mr. Nowak's alleged sequences.

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[34] Venkataraman Decl., p. 11.

[35] For the purpose of this analysis, I define order book imbalances as instances in which the difference between aggregate bid and offer depth in the top five levels of the order book are one standard deviation higher or lower than the average balance state. I calculated order book balance as the difference between the aggregate volume in the first five bid price levels minus the aggregate volume in the first five offer price levels. I calculated order book balances for each market update and the average of all balance states is taken over all market updates. I determined the market is imbalanced when the balance state is one standard deviation away from the mean. Imbalance thresholds are presented in Appendix B and range from 27 - 94 lots depending on the contract.

B. Alternative Adjustment

61. As in Prof. Venkataraman's unadjusted market loss calculation, my alternative unadjusted calculation (described above) does not account for the fact that a certain amount of spread-crossing would have occurred regardless of any purported impact of Mr. Nowak's alleged spoof orders, which inflates the resulting range of theoretical loss. Therefore, I calculate an adjustment to the calculation to deduct baseline spread-crossing that cannot be attributed to Mr. Nowak's alleged spoof orders. It must be emphasized that this analysis simply reduces the theoretical loss to the proportion of fills that *could* relate to Mr. Nowak's activity, because it still does not account for market context (consistent with Prof. Venkataraman's approach). Without conducting thorough market analysis, it is simply not possible to prove with any degree of reliability whether Mr. Nowak's trading in fact caused the response of any given market participant during any given sequence, let alone prove whether the market participant was in fact harmed.
62. The foundation of my methodology for calculating this adjustment is the well-understood notion that any randomly selected trade is as likely to have resulted from a buyer crossing the spread to lift a resting offer as it is to have resulted from a seller crossing the spread to hit a resting bid.
63. To confirm this point, I analyzed all of the trade executions in the available RAPID data. I identified the aggressive side of each trade by using the aggressive indicator in the RAPID data, when available. When the aggressive indicator was not available in the RAPID data, I identified when the matched orders were placed, and determined that the earlier-in-time order was necessarily the resting order and that the later-in-time order was the aggressor.[36]
64. For each date on which Mr. Nowak traded a given precious-metals futures contract, I analyzed all trades in that contract, and I found that 49.73% of the trades resulted from the buyer crossing the spread, and 50.22% of the trades resulted from the seller crossing the spread.[37] In other words, for any random selection of trades (including those during an

[36] See n. 5 corresponding to paragraph 16 of this declaration.
[37] In both scenarios, there are a few trades that I do not classify as trades on the bid or offer side. In these cases, it appears that neither side of the trade was placed aggressively. My analysis of instances where there did not appear to be an aggressive offer in the market suggests that this often occurred at market open.

alleged spoofing sequence), the expected outcome is for half of those trades to result from aggressive trading on the bid and half from aggressive trading on the offer.

Table 2 - Fill by Aggressive Side Analysis

Analysis of Fills for the Gold Dates and Instruments where Mr. Nowak was Active		
Aggressive Order Side	Total	Percent
Buy-Side	44,375,864	49.73%
Sell-Side	44,810,261	50.22%
None	41,145	0.05%
Total	**89,227,270**	

65. With this foundational principle established, I analyzed trading activity during Mr. Nowak's alleged spoofing sequences to measure for any difference in spread-crossing when Mr. Nowak's alleged spoof orders were resting in the market.[38] For example, for an alleged spoof order to buy, I determined whether there were more traders crossing the market to buy (i.e., to aggress offers resting in the order book) than those crossing the market to sell (i.e., to aggress bids), deviating from the expected 50/50 split. For the sake of this calculation, I assume that all such deviations resulted from Mr. Nowak's trading activity, as opposed to other market activity or other market forces, though that likely overstates the effect of Mr. Nowak's orders.

Table 3 – Fill by Aggressive Side During Prof. Venkataraman Sequences, up to 3.2 Seconds after Large Side Threshold is Reached

Analysis of Aggressive Side for Fills During Alleged Spoofing Sequences for 3.2 Seconds after Large Side Size Threshold is Reached		
Aggressive Side	Total	Percent
Opposite Side	39,208	33.5%
Spoof Order Side	77,682	66.4%
Other	33	0.1%
Total	**116,923**	

[38] As with the rest of my alternative analysis, here I only include the Prof. Venkataraman sequences than contained alleged spoof orders that resulted in a market-level order book imbalance.

Table 4 – Fill by Aggressive Side During Prof. Venkataraman Sequences, up to 0.9 Seconds after Last Order in the Scale is Placed

Analysis of Aggressive Side for Fills During Alleged Spoofing Sequences for 0.9 Seconds After Last Order in the Scale Group is Placed		
Aggressive Side	Total	Percent
Opposite Side	32,041	30.4%
Spoof Order Side	73,283	69.6%
Other	31	0.1%
Total	**105,355**	

Table 5 – Analysis of Aggressive Side for Fills During Prof. Venkataraman's Sequences Involving Nowak

Analysis of Aggressive Side for Fills During Prof. Venkataraman's Sequences Involving Nowak		
Aggressive Side	Total	Percent
Opposite Side	141,187	42.9%
Spoof Order Side	187,757	57.1%
Other	100	0.1%
Total	**329,044**	

66. This analysis confirms that excess spread-crossing by market participants who *could* have been induced to trade by Mr. Nowak's orders is vastly overstated by Prof. Venkataraman. Even though the selected sequences included market imbalances, there is only a modest deviation from the default (50/50) spread crossing. In particular, in the 3.2 seconds after the large side size threshold is reached, 66.4% of the fills resulted from spread-crossing from the side of the alleged spoof orders. In the 0.9 seconds after the last order in Mr. Nowak's scaled order was placed, 69.6% of the fills resulted from spread-crossing from the side of the alleged spoof orders. In other words, compared to the expected rate of 50%, only 16.4% (if using 3.2 seconds) and 19.6% (if using 0.9 seconds) of the spread-crossing activity may be theoretically attributed to the scaled orders.

67. When examining the rates of excess spread-crossing over the full duration of Prof. Venkataraman's alleged spoofing sequences the amount of overcounting is even more significant. As noted in Table 5 above, during the full alleged spoofing sequences 57.1% of

the fills resulted from spread-crossing from the side of the alleged spoof orders (i.e., in the direction purportedly induced by the spoof), while 42.9% of the fills resulted from spread-crossing to the side of (i.e., against) the alleged spoof orders. In other words, compared to the expected rate of 50%, only 7.1% of the spread-crossing activity may be theoretically attributed to the imbalance.

68. Using the results above, I calculated a theoretical adjusted alternative market loss by multiplying the results of my alternative unadjusted calculation by 16.4% and 19.6%. Applying this methodology results in an adjusted range of $59,927 to $70,452. Prof. Venkataraman's methodological flaws therefore lead him to inflate the theoretical market loss attributable to Mr. Nowak's alleged spoofing by at least 5,289%.[39]

69. While this measure of theoretical loss is more economically and statistically sound than Prof. Venkataraman's calculations, it is still improper to assume, as Prof. Venkataraman does (and as I have now done only to provide an alternative measure of market loss), that Mr. Nowak and other market participants who were active during the sequences operated in a vacuum, thereby artificially excluding the many other market forces and variables that interfere with establishing a reliable causal link between his trading and theirs.

70. I also disagree with the assumption (that Prof. Venkataraman embraces and that I have adopted for purpose of this calculation) that market participants who cross the spread necessarily suffer a loss. Even if one assumes that each market participant who crossed the spread was induced by an alleged spoof order, one still must know when and how the market participant offset its position to determine whether the trade in fact resulted in a loss. Proper accounting of actual profits and losses would be necessary to exclude such market participants who profited rather than lost. The available trading data would have allowed Prof. Venkataraman to calculate whether traders actually suffered a loss, but again, he declined to perform that analysis. Instead, he assumed that every trader suffered a loss when offsetting their trade, which is highly unrealistic in these markets.

[39] Prof. Venkataraman's alternative adjusted market loss attributable to Nowak ($3,726,400) / my alternative adjusted calculation ($70,452) = 52.89, or 5,289%.

C. Conclusion

71. The analysis discussed above demonstrates that the methodology employed by Prof. Venkataraman cannot reliably calculate theoretical market losses associated with Mr. Nowak's alleged spoof orders. I presented an alternative calculation that overcomes many (but not all) of the flawed assumptions used by Prof. Venkataraman. Using my alternative methodology, I determined that the theoretical market loss that could be associated with Mr. Nowak's alleged spoof orders is no more than $70,452.

Jeremy J. Cusimano
April 10, 2023

APPENDIX A

Curriculum Vitae of Jeremy Cusimano

Jeremy J. Cusimano
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Jeremy Cusimano is a Managing Director with Alvarez & Marsal Disputes and Investigation LLC in Boston, Massachusetts. He specializes in financial markets, trading, compliance, risk, and controls. He has extensive experience in global financial markets, economic analysis, investigations into commodity and derivatives trading, and regulatory policy.

Mr. Cusimano developed and led the U.S. Commodity Futures Trading Commission's first group of economic experts dedicated to the forensic analysis of trading and market events to identify potential violations of the Commodity Exchange Act. He has performed numerous investigations involving exchanged-traded and OTC physical commodities, financial derivatives, cryptocurrencies, and other securities. Across these investigations he has developed quantitative models to analyze complex market structures and derivatives portfolios, evaluated trading and risk management strategies, and valued portfolio impacts of market activity. He has provided expert analysis to support investigations and litigation to and in front of numerous regulatory and law enforcement agencies (e.g., CFTC, SEC, FERC, DOJ, NFA, FINRA, UK FCA) including examination of potential price manipulation, disruptive trading, trade practice regulation violations, electronic trading systems irregularities, and fraud.

Mr. Cusimano also has extensive experience advising clients on a range of operational challenges, including compliance, risk management, regulatory reporting, financial operations, and trade surveillance. He works with financial institutions of all sizes to ensure that the design and function of risk and compliance programs meet all operational and regulatory requirements.

Prior to joining A&M, Mr. Cusimano was a managing director with Grant Thornton LLP where he led the firm's commodities and derivatives related advisory services. Mr. Cusimano previously served as Economic Advisor to the Director of Enforcement at the U.S. Commodity Futures Trading Commission and Chief Economist for Petroleum Reserves at the U.S. Department of Energy.

Representative Experience

- Engaged by counsel for an international commodity merchant to assess claims of fraud and manipulation in global petroleum markets. The engagement required analysis of the client's physical and financial trading along with logistical and trade accounting data to assess potential regulatory concerns.
- Engaged by a large international broker and U.S. regulated Swap Dealer to assess possible misuse of customer trading information by an affiliate. This engagement required analysis of customer order

flow along with communications and trading activity of the broker's affiliate to determine if its employees were exploiting customer orders.

- Engaged by counsel for a large U.S. financial institution to assess claims of potential manipulation of the S&P 500 Volatility Index (VIX). The objective of the engagement was to evaluate the nature of business activities surrounding S&P Index derivatives and to assess possible VIX manipulation. The project included analysis of exchange listed and OTC VIX linked products and S&P 500 Index options.
- Engaged by outside counsel for a U.S. based cryptocurrency trading venue to support a wide-ranging internal investigation. A&M conducted analysis of market activity to screen conduct of employees and market participants for a variety of potential conduct violations. This engagement also required an assessment of the client's trading operations for potential improvements in operational controls and liquidity management.
- Engaged by outside counsel for a large cryptocurrency trading platform to assess market supervision and trade surveillance practices. The engagement required evaluating the platform's systems and controls in place to monitor market trading practices.
- Engaged by outside counsel for a large U.S. based trading venue to analyze market activity around the launch of a new product. This engagement required analysis of trading and order submission practices to evaluate the causes of extreme volatility around the product launch. A&M's team also analyzed broader market activity and chatter to assess off-platform activity that could be related to the product launch. A&M made recommendations for new procedures relating to product launches and trading controls in thinly traded products.
- Retained by the appointed compliance monitor for a multi-billion-dollar family office to provide an independent assessment of its insider trading and market abuse trade surveillance systems and certain other trading activities pursuant to a settlement with the SEC. This project was performed concurrently with legal counsel an independent assessment of the family office's compliance with federal securities laws.
- Engaged by counsel for a U.S. based asset manager to evaluate SEC concerns regarding improper allocation of equities trades to customer accounts. This engagement required analyzing multiple years of equities trading data and allocations made to customer subaccounts to evaluate patterns of profitable and losing allocations across all customers.
- Engaged by counsel to a U.K. based trading firm to evaluate FCA concerns regarding market abuse (spoofing) in equity CFD trading in dark pools. This engagement required analyzing order messaging and trading data for equity CFDs and listed securities to evaluate possible regulatory violations.
- Engaged by outside counsel for a multi-national oil and gas company to review and analyze global propane trading activities and related evidence in response to a formal enforcement investigation into alleged market manipulation. The review included a presentation of findings and a detailed explanation of the firm's trading and risk management practices.
- Engaged by outside counsel for a large multinational integrated oil company. A&M's team is assisted counsel and their client in responding to a regulatory investigation into possible manipulation of U.S. natural gas markets. Our team analyzed the client's trading data and market information for an 18-month period of time. We reconstructed risk positions to evaluate trading strategies and the appropriateness of market conduct. Our team also assessed market impacts of any trading activity that was deemed to be suspicious.

- Investigated allegations by an SRO that a proprietary trading firm was engaged in disruptive trading. Worked with in-house and outside counsel to evaluate patterns of market messaging activity to assess the nature of the traders' conduct and potential regulatory concerns. Also provided guidance on establishing appropriate trade surveillance systems.
- Engaged by outside counsel for an electric power generator and marketer in the United States to assist in responding to a federal regulatory inquiry into the firm's physical and financial electricity trading. Successfully performed a reconstruction and verification of trading portfolios and trade executions used in describing and explaining the firm's conduct and business practices in the marketplace.
- Engaged by counsel for a trader at a large international bank to investigate allegations of disruptive trading in European bond markets. The investigation required analyzing trading and order messaging activity in electronic bond markets to assess possible "spoofing" and to evaluate the legitimacy of the bank's activity.
- Working with counsel for a large proprietary trading firm, A&M's team analyzed multiple years of order messaging activity in U.S. Treasury Futures markets to evaluate allegations of spoofing. Our analysis included identifying and evaluating multiple trading strategies to assess how trader behavior changed over time with respect to possible regulatory violations.
- Working with a global asset management firm and its outside counsel, I assisted in a regulatory investigation in front of the UK Financial Conduct Authority. This engagement required the evaluation of allegations that a trader of the firm was engaged in spoofing in European bond futures markets. The analysis covered multiple years of the trader's market activity and messaging practices. It also established normative patterns of behavior and assessed the commercial nature of the activity at question. Provided advice and guidance on the development of a trade surveillance system.
- Engaged through outside counsel to support a large international bank in its efforts to respond to allegations that its US Treasuries and interest rate swaps traders manipulated a global interest rate benchmark. Our team provided strategy consulting services to the bank's outside counsel as well as economic consulting and market analysis services. These analyses were used to evaluate the banks market conduct in the context of its overall business activities and the Commodity Exchange Act.
- Assisted a large U.S. based financial institution in a compliance risk assessment for its FX dealing business. Advised the client on the integration of its compliance risk assessment process into the operational risk framework for its global investment bank.
- Engaged by outside counsel for a global investment bank to evaluate allegations that its traders had engaged in a scheme to manipulate foreign currency markets. Led an analysis of the bank's market activities in multiple currency pairs to distinguish dealing and speculative activities, evaluate potential market impacts, and assess possible regulatory concerns.
- Served as a consultant to a U.S. bank to assess the implementation of its Dodd-Frank mandated risk management program for its registered swap dealers. The review included evaluations of the program's documented policies and procedures, supervisory controls, as well as the systems that were put in place to execute the program requirements.
- Managed an internal audit review of risk management systems and reporting at a large financial institution. The review covered all aspects of the development, deployment, and use of risk systems, as well as the policies and procedures put in place to monitor portfolio manager risk.
- Assisted the energy trading arm of an international bank in responding to a regulatory inquiry regarding its physical and financial natural gas trading. Led an analysis of the bank's regional gas trading portfolio and assisted in assessing various risk management strategies involving financial

derivatives. The analysis evaluated potential regulatory concerns regarding manipulation of physical natural gas markets and related derivatives.

- Engaged by a large international commodity merchant to assist in responding to a regulatory inquiry into its refined products trading activity. This project required the extraction of historical cleared and OTC physical and derivative trading records for use in reconstructing trader portfolios, evaluate trading strategies, assess risk exposures and identify potential regulatory concerns. The final report differentiated the various trading strategies being employed by the firm, including identification of trades that were related to hedging activities.
- Served as a consultant to an international risk management firm that offers weather related swaps and other structured derivative products to clients and is required to report its swap transactions to swap data repositories (SDR). I advised the client on reporting processes and documentation and created reporting templates for SDR submissions for each of its required reports.
- Engaged by a swap execution facility to map and document all of its internal trade data capture, transformation and reporting processes, as required by the CFTC. The engagement required identifying internal processes through interpretation of the client's data processing source code. All internal data sources and processes were mapped to external reporting formats.
- Advised a nascent futures exchange on regulatory requirements for registering with the CFTC as a Designated Contract Market. I also provided the client with advice on market design, trading operations, and necessary control systems.
- Engaged by a large Futures Commission Merchant (FCM) to review and evaluate the effectiveness of its existing internal controls and policies and procedures related to preventing, detecting, and mitigating potential violations of the Commodity Exchange Act and CFTC Regulations. Also engaged to review and evaluate the FCM's financial systems to determine the extent to which they provide real-time financial and operational data for risk management and reporting purposes. This project also required a review and evaluation of the FCM's risk management processes to ensure adequate controls and procedures are in place to limit the financial risks of the FCM, ensure adequate liquidity, and properly manage customer segregated funds.
- Managed an engagement with an international bank to serve as consultants in assessing the breadth of its investment banking activities within a recently opened administrative office. The bank's management sought to ensure the scope of its market activities were within the bounds of those permitted under Federal and State regulations and that local management controls were sufficient to monitor those activities.

Prior Testimony

- Before the Federal Energy Regulatory Commission, Docket No. EL02-71-057. Prepared answering testimony on behalf of Shell Energy North America (US), L.P. regarding the reporting of power market transactions and market surveillance.
- JAMS Arbitration (Seattle, Washington). Provided expert testimony on behalf of a cryptocurrency trading platform regarding standards of practice in market surveillance and the inability of market surveillance to prevent certain transactions. July 2022.
- US v. Smith, et. al. (Northern District of Illinois). Provided expert testimony on behalf of a defendant facing charges relating to spoofing and commodities fraud. July 2022.

Publications and Selected Presentations

- *Effectively Managing Compliance Risks Around Volatility Index (VIX) Trading*, Alvarez & Marsal LLC Publication, February 2018
- *Commodities and Derivatives Trading Operations: A Framework for Identifying and Managing Regulatory Risks*, Grant Thornton Publication, April 2013

Education

Master of Science, Environmental and Natural Resource Economics, University of Maine

Bachelor of Science, Economics, Rochester Institute of Technology

APPENDIX B

Listing of Lower and Upper Market Imbalance Thresholds for the Top Five Price Levels by Contract

Market Imbalance Thresholds for the Top 5 Price Levels for Gold Products Mr. Nowak Traded			
Contract Code	Contract Description	Lower Imbalance	Upper Imbalance
GCM9	Gold Futures - June '09	-41.6	41.0
GCQ9	Gold Futures - August '09	-45.5	44.8
GCZ9	Gold Futures - December '09	-50.1	51.7
GCG0	Gold Futures - February '10	-49.8	48.6
GCJ0	Gold Futures - April '10	-46.2	47.6
GCM0	Gold Futures - June '10	-93.7	92.4
GCQ0	Gold Futures - August '10	-46.7	45.0
GCZ0	Gold Futures - December '10	-52.3	50.9
GCG1	Gold Futures - February '11	-44.4	39.5
GCJ1	Gold Futures - April '11	-51.1	46.9
GCM1	Gold Futures - June '11	-44.4	40.9
GCQ1	Gold Futures - August '11	-39.7	38.7
GCZ1	Gold Futures - December '11	-28.0	26.8
GCG2	Gold Futures - February '12	-33.2	30.9
GCJ2	Gold Futures - April '12	-35.2	33.2
GCM2	Gold Futures - June '12	-34.3	33.6
GCQ2	Gold Futures - August '12	-28.4	26.6
GCZ2	Gold Futures - December '12	-35.1	34.4
GCG3	Gold Futures - February '13	-34.3	30.1
GCJ3	Gold Futures - April '13	-38.2	38.9
GCM3	Gold Futures - June '13	-33.6	34.6
GCQ3	Gold Futures - August '13	-32.9	32.1
GCZ3	Gold Futures - December '13	-31.1	31.4
GCG4	Gold Futures - February '14	-48.3	48.7
GCJ4	Gold Futures - April '14	-38.2	37.5
GCM4	Gold Futures - June '14	-43.2	41.8
GCQ4	Gold Futures - August '14	-50.5	49.4
GCZ4	Gold Futures - December '14	-45.4	46.8